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ABSTRACT

The Rural Satellite Program of the U.S. Agency for International Development was a 6-year effort (1981-87) to explore the potential uses of two way telecommunications facilities, particularly satellite-mediated, telephone-based technologies--to support Third World Development educational endeavors. This program created three audioconferencing networks in Indonesia, the West Indies, and Peru that linked widely scattered locations and allowed for rapid communication and the sharing of scarce human resources. The Indonesian Distance Education Satellite System and the University of the West Indies Distance Teaching Experiment offered primarily undergraduate and graduate courses, while the Peru Rural Communications Services Project provided in-service training to agricultural extension and health care workers, teachers, and government personnel. Each project had its own technical difficulties, with the common problem of noisy local lines for telephone transmissions. The different nature of each of the systems led to different approaches in program planning although each project generally suffered from a lack of optimal funding for central management and program development. Each of the projects had a strong impact upon the areas and institutions involved, with audioconferencing shown to be a reliable, acceptable, and effective tool. Following the end of the pilot periods, the three networks continued with funding by the host agencies and were expanded. (ALL)

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EDUCATION VIA SATELLITE: A TRINATIONAL PERSPECTIVE

by

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Academy for Educational Development

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The U.S.AID Rural Satellite Program has been a six-year effort (1981-87) initiated by AID's Bureau for Science and Technology/Education to explore the potential uses of two-way telecommunications facilities—particularly satellite-mediated, telephone-based technologies--to support Third World Development efforts. The main focus of the program, implemented by the Academy for Educational Development, was on the creation of three audioconferencing networks in Indonesia, the West Indies, and Peru which linked widely-scattered locations and allowed for rapid communication and the sharing of scarce human resources.

The Indonesian Distance Education Satellite System (SISDIKSAT) links 13 remote government universities and the Directorate General of Higher Education (DGHE) in Jakarta into a two-channel telephone network that provides voice, facsimile, and telewriter facilities. The system is primarily used for an undergraduate course-sharing program among the participating campuses that reaches 2-3000 students each semester and for faculty upgrading activities annually involving 1-2000 university teachers. The system is also used by the Indonesian Open University for tutor training programs and by a variety of educational groups for administrative coordination. Plans are now underway to develop an in-service teacher training program for high school teachers. SISDIKSAT is managed by faculty members from the participating campuses. The communications links are provided through a contract with the national telecommunications company, PERUMTEL.

The University of the West Indies Distance Teaching Experiment (UWIDITE) connects the 3 main UWI campuses on Jamaica, Trinidad, and Barbados with 3 of its 11 extramural centers located on other island nations. A multinational institution supported by 14 countries, UWI uses a single channel audioconferencing network, supplemented with slow-scan video, to extend learning opportunities and support to its Caribbean constituency. UWI offers undergraduate, professional certificate, and enrichment courses for an audience including university students, university and high school teachers, doctors, and nurses. UWIDITE is managed by a university staff directed by the Pro Vice-Chancellor of UWI. Communications links are provided under contracts with the telecommunications authorities in the six countries currently connected.

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The Peru Rural Communications Services Project (RCSP) is different from the first two projects in that it is managed by the Peruvian telecommunications authority itself, ENTEL, and also provides regular telephone service to the general population in the project areas. RCSP connects 7 rural communities with populations from 800-15,000 into the national telephone network and also provides audioconferencing services to the agriculture, health, and education ministries. A social services planning unit created within ENTEL works with local, regional, and national-level officials to organize in-service training and administrative meetings wtih agricultural extension and health care workers, teachers, and other government personnel in the project areas.

The experience gained and lessons learned from these three projects have been many. While this paper is far too short to deal with all of them, I will try to give a summary of some of those experiences and lessons.

Technical Performance: Each of the systems encountered serious technical obstacles during the installation phase. Not all of the technical problems were the same; however, noisy local lines were a problem in all projects. Sites close to earth stations and using new cable generally had fewer problems. Local technical staff were readily able to deal with the technology after periods of training and experience. The audio, fax, and slow-scan equipment was more reliable than the two telewriting systems used. Most of the technical obstacles were surmounted and a high reliability percentage in delivering planned programs was achieved in all projects: Indonesia (98%), Peru (96%), West Indies (90%). The major long-term challenge is a managerial one: the regular maintenance and repair of the networks.

Program Planning: The different nature of each of the systems led to different approaches to program planning. The multi-institutional SISDIKSAT followed general guidelines from DGHE but primarily relied upon periodic meetings with program coordinators from each campus to determine the courses to be taught. As a single institution, though a multi-national one, UWI had an ongoing set of programs that it wished to support, although it did respond to other needs of its audience. It also had more power to implement its programs and obtain local cooperation. In Peru, ENTEL had to work with a variety of ministries and departments to develop appropriate uses. Each project generally suffered from a lack of optimal funding for central management and program development.

Program Delivery: Programs were generally 1-2 hours in duration. Courses met weekly for four months, some administrative meetings ran every week for a year, and most seminars had only one session. Print materials supported most programs. Slow-scan video and locally-shown slides were also used. Materials developers, program presenters, and users were given orientation or training by project staff and a variety of training materials were developed in each project.

Program Monitoring and Evaluation: Each project had a monitoring system to obtain information helpful to management and users, such as data on attendance, technical quality, equipment status, and satisfaction of clientele. Generally, however, the incoming data was not readily incorporated into management decisions since it was either collected or processed too late to have an effect due to inadequate resources and manpower. Most of the evaluation activities were conducted by the AID contractors. Anecdotal information often played a greater role in affecting decision making than hard data.

Participant Satisfaction: Participants in all three projects were generally enthusiastic about the learning opportunities provided by the systems. The beneficiaries of in-service training activities were usually the most enthusiastic audiences and the ones most appreciative of the two-way communications capability. These were generally people older than the average undergraduate who had defined learning needs and who recognized the value of the learning opportunity afforded them. Teachers reacted favorably to the technology and experienced little difficulty in adapting to teaching via satellite, although most thought that it was more demanding than teaching regular classes.

Results: Each of the projects has had a strong impact upon the areas and institutions involved. Course materials are often adopted for use by teachers outside the networks. Teachers in remote areas have the opportunity to work with "master teachers" with advanced degrees and experience. Audioconferencing was shown to be a more cost-effective alternative to some face-to-face programs. It was also shown to be capable of providing services that otherwise could not be provided—like a multisite seminar program in Indonesia that attracted over 1800 participants. In addition to delivering needed courses and doubling the annual number of teachers completing the Certificate of Education program, UWIDITE also provided training to 300 nurses and 200 doctors. In the rural areas of Peru reached by RCSP, over 80% of the government field workers participated in in-service training activities via satellite. Audioconferencing was shown to be a reliable, acceptable, and effective tool for social development purposes.

The Future: The 3 networks continue to be funded by the host agencies following the end of USAID support and are being expanded. Indonesia has added 3 sites to the original 12 and is seeking World Bank funding for a replication of SISDIKSAT in western Indonesia. Two sites are being added to UWIDITE and over a million dollars has been earmarked for additional capital costs. ENTEL-Peru is obtaining 19 small earth stations so that it can reach other remote rural areas of the country. The continued expansion of satellite services across the world and the increasing availability of low-cost technologies indicates that the use of telecommunications for social development purposes will become even more common and effective in the years ahead.

WHAT IS THE AID RURAL SATELLITE PROGRAM?

- **A 6-year R&D program on the use of telecommunications as a development tool**

Specifically,

- Designing telecommunications projects to support development activities in agriculture, health, and education
- Assisting LDC institutions in educational use of the technology
- Assessing specific equipment and technologies for the developing world environment
- Working with policymakers to expand development applications of telecommunications
- Evaluating impact and effectiveness

WHAT DID THE RURAL SATELLITE PROGRAM DO?

Three Pilot Projects were designed and implemented in:

- **Indonesia:** linking 13 universities spread over 2,500 miles in a distance education network
- **Peru:** providing 7 towns in the Amazon basin with basic telephone service and a teleconferencing network for the training and administrative support of field workers
- **West Indies:** establishing a 7-nation teleconferencing network to support the University of the West Indies and other regional development activities

The Pilot Projects shared information and scarce human resources through a variety of distance education programs delivered over a single telephone circuit.

- University courses
- Teacher training
- In-service training for field workers
- Health campaigns
- Research support
- Administration and coordination activities

The Pilot Projects introduced and adapted new technologies such as:

- Unattended, solar-powered small earth station in Indonesia
- Small, 6.1-meter earth stations to connect into domestic satellite network
- Innovative, low-cost designs for rural communication networks

WHAT ARE THE COSTS OF A TELECONFERENCING NETWORK?

Three cost elements must be considered:

- o the capital costs -- the teleconferencing equipment, associated hardware, and facilities;
- o the transmission costs -- satellite "air time" and telephone lines; and
- o the management and maintenance costs -- operating the systems and developing programs for delivery.

Capital and Recurring Costs

Cost Element	SISDIKSAT (Indonesia)	UWIDITE (West Indies)	RCSP (Peru)
o Audio Equipment	$ 9,941/site	$ 4,985/site	$ 4,549/site
o Annual Transmission	118,750/yr.	104,000/yr.	no charge
o Annual Management	82,313/yr.	139,702/yr.	33,300/yr.
o Hourly Cost (transmission & management)	94/hr.	140/hr.	68/hr.

Cost Effectiveness: Comparison with Face-To-Face Delivery Methods

Activity	Face-to-Face	SISDIKSAT	UWIDITE	RCSP	Savings
o Course	$ 1,281/site	$ 542/site			58%
o Seminar (1 day, 84 people)	11,250		1,000		90%
o Workshop (6 days, 20 people)	9,325	3,384			64%
o Training (31 sessions)	4,000			2,600	35%
o Teaching Certificate	8,172/ student		3,836/ student		54%
o Visiting Professor	64/course/ student	11/course/ student			83%

WHAT DID THE RURAL SATELLITE PROGRAM PROVE?

Telephone-based technology can be made reliable:

- o 98% technical reliability in Indonesia
- o 96% technical reliability in Peru

Telephone-based systems can answer development needs:

Indonesia--

- o Extends expert teaching of 17 courses to over 3,500 students each semester
- o Voluntary seminar programs attract over 1,800 participants

Peru--

- o Telephone capacity expanded twice with Peruvian funds
- o Telephone service used by over two-thirds of the region's families, yielding $100,000 annual revenue
- o Provides over 300 training conferences per year for health, agriculture, and education field workers

West Indies--

- o Doubled the annual number of Certificates of Education awarded by UWI
- o Reaches over 500 health care professionals in the region

Teleconferencing is effective:

Peru--

- o 92% of participants rate the teleconferencing program as beneficial and immediately relevant to their work
- o Over 80% of field workers in the region participated in teleconferences

Indonesia--

- o 99.2% of seminar participants requested that additional seminars be offered
- o 74% of students indicated they learned especially well from the interactive question and answer sessions
- o 67% of students felt they learned as much or more from the distance courses as from their regular classes
- o 95% of local tutors felt the students learned as much or more from distance courses
- o 100% of local tutors believed the distance course improved their teaching of similar courses on campus

Teleconferencing is affordable:

- o Course delivery cost $10/course/student over the system versus $64/course/student using existing "flying dosen" (visiting professor) program in Indonesia
- o A one-week training course for 30 people in the West Indies costs $6,000 using the system versus $19,000 for face-to-face meetings at one central location

Teleconferencing is readily manageable by developing-nation institutions.

- o Part-time university staff manage the 15-site Indonesian system
- o UWI fully operates its Caribbean-wide network
- o Peru's telecommunications company manages social applications

WHAT DOES THE FUTURE HOLD FOR THE PILOT PROJECTS?

All host countries have continued and expanded these networks after the completion of A.I.D. funding in the 1985-86 period.

In Indonesia:

- o Ministry of Education continues to fund the system
- o 3 sites have been added with host-country funds
- o Most classrooms have been expanded to accommodate more participants (in some cases, over 100 seats)
- o Open University (enrollment 150,000 students) depends on the teleconferencing system for administration and tutor training in eastern Indonesia
- o Ministry of Education is conducting its primary and secondary teacher upgrading program via the system
- o Other Ministries and organizations have recently requested use of the system or development of their own networks
- o Ministry of Education is seeking funds from the World Bank for the creation of a satellite network in western Indonesia.

In Peru:

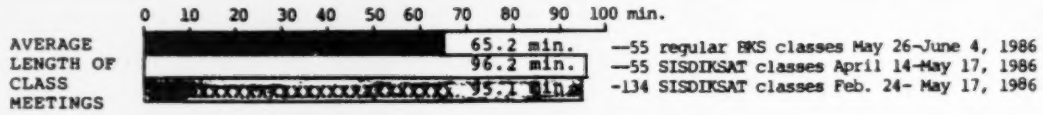
- o 2 sites have been added due to local demand
- o Peru's telecommunications authority (ENTEL) continues to offer the social service conferencing program
- o 19 local earth stations are being addd by ENTEL in 1987-88 based on the RSP experience
- o CORDES (rural development authority) has pledged $45 million for telecommunications infrastructure in 700 rural communities based on Pilot Project success
- o ENTEL has proposed project extension to 53 communities in the Andean Trapezoid
- o ENTEL plans to offer commercial teleconferencing service to industry and business

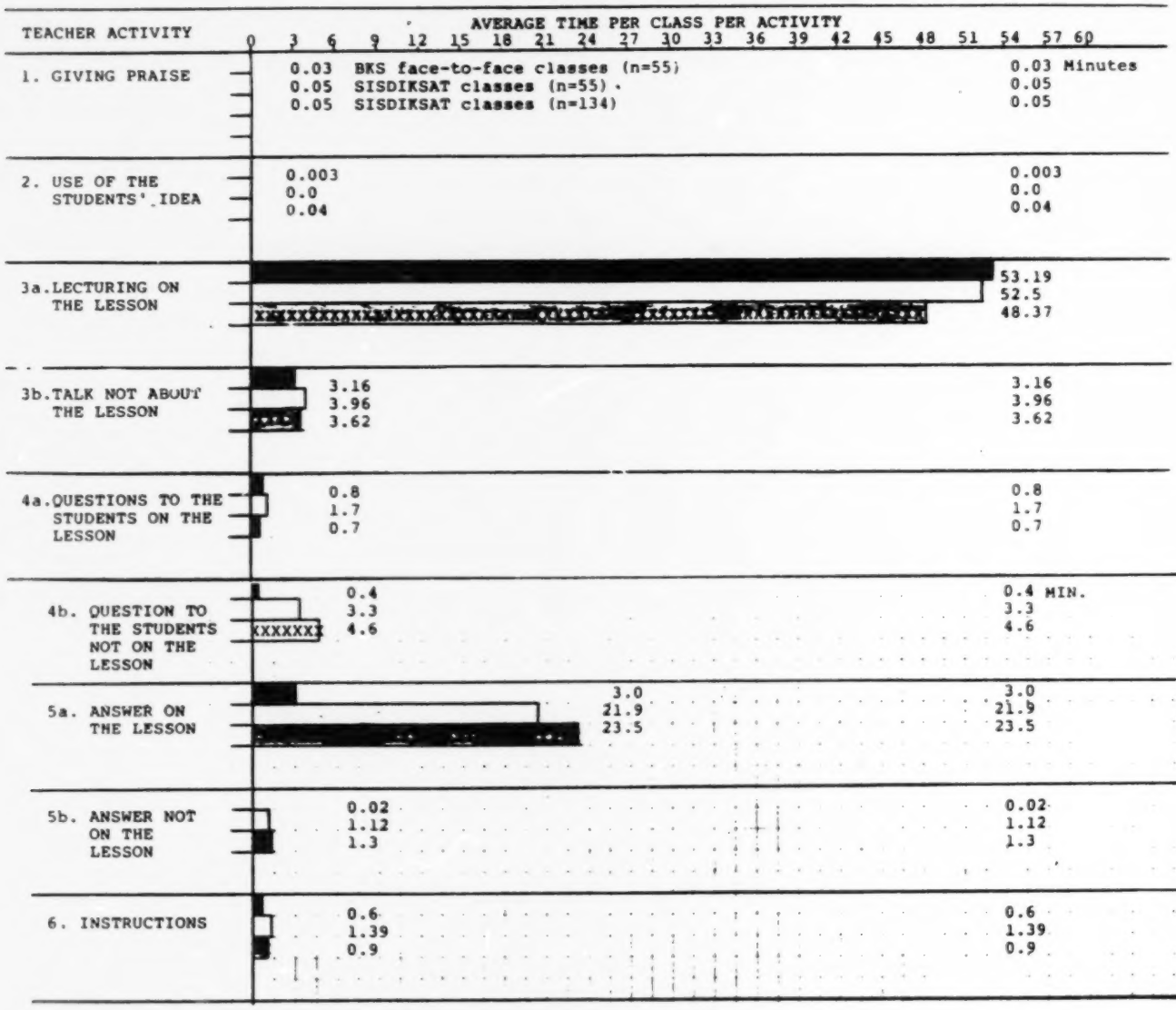
In the West Indies:

- o 2 nations have been added to the original system; others being planned
- o Challenge Exam program will be presented exclusively over the system for all UWI students
- o JHPIEGO reproductive health program relies solely on the system for doctor and nurse training programs
- o Other international and regional organizations--ILO, Project Hope, PAHO, Caribbean Food and Nutrition Institute--regularly use and pay for the system to deliver programs
- o The Project won the 1984 Gleaner Honor Award for its **". . . most dramatic impact on the quality and improvement of life not only in Jamaica but the entire Caribbean, enhancing the education of the people of the region."**
- o UWI has incorporated network cost into its regular budget

COMPARISON OF CLASSROOM INTERACTION DATA FROM SISDIKSAT AND REGULAR BKS CLASSES

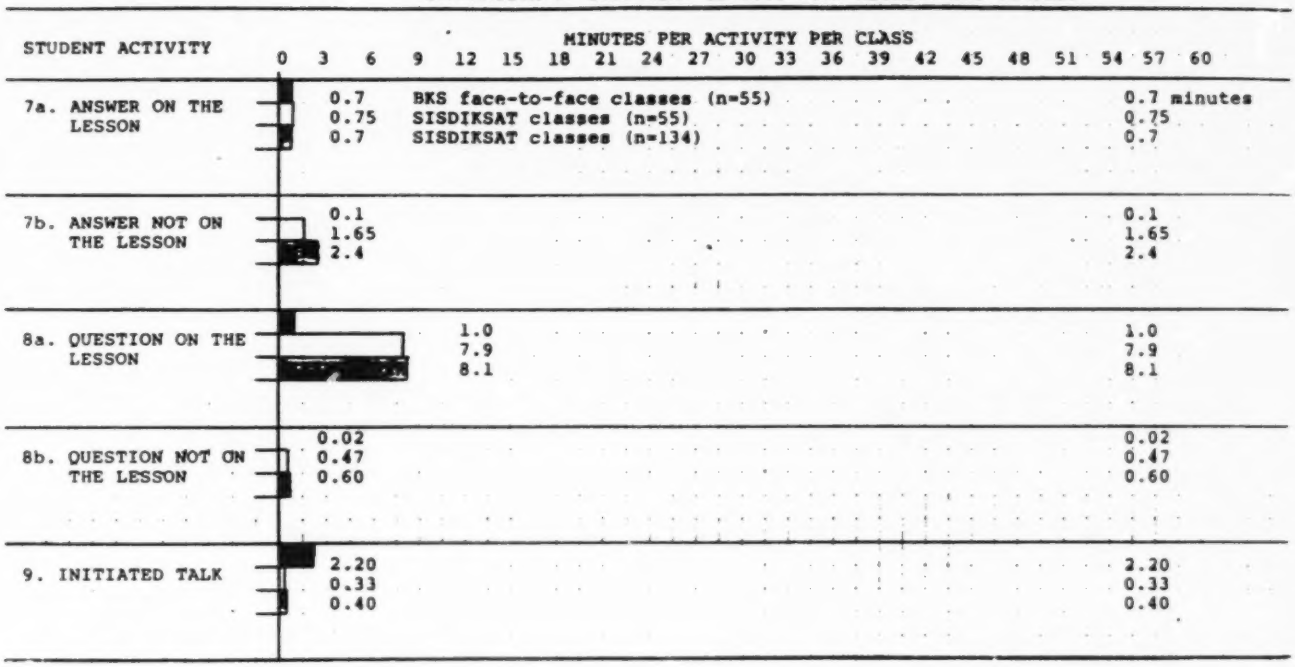
ALLOTMENT OF CLASS TIME


0 10 20 30 40 50 60 70 80 90 100 min.
AVERAGE LENGTH OF CLASS MEETINGS
65.2 min.
96.2 min.
95.1 min.
—55 regular BKS classes May 26-June 4, 1986
—55 SISDIKSAT classes April 14-May 17, 1986
-134 SISDIKSAT classes Feb. 24- May 17, 1986



STUDENT PARTICIPATION

COMPARISON OF SISDIKSAT CLASSES WITH REGULAR BKS CLASSES


STUDENT ACTIVITY
MINUTES PER ACTIVITY PER CLASS
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60
7a. ANSWER ON THE LESSON
0.7 BKS face-to-face classes (n=55) 0.7 minutes
0.75 SISDIKSAT classes (n=55) 0.75
0.7 SISDIKSAT classes (n=134) 0.7
7b. ANSWER NOT ON THE LESSON
0.1 0.1
1.65 1.65
2.4 2.4
8a. QUESTION ON THE LESSON
1.0 1.0
7.9 7.9
8.1 8.1
8b. QUESTION NOT ON THE LESSON
0.02 0.02
0.47 0.47
0.60 0.60
9. INITIATED TALK
2.20 2.20
0.33 0.33
0.40 0.40